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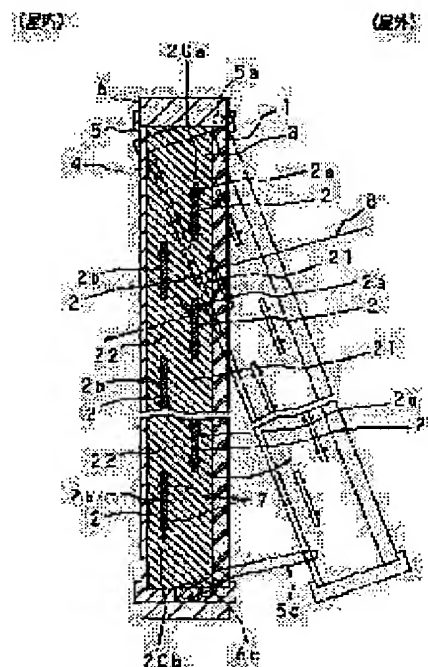
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(54) SOLAR BATTERY MODULE AND WINDOW STRUCTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a solar battery module which enhances electricity generating efficiency thereof, and has a daylighting function, and to provide a window structure using the solar battery module.

SOLUTION: In the solar battery module, double-faced power generating solar battery element rows 2a, 2a, etc., are arranged in a plane with translucent portions 21, 21, etc., therebetween, and solar battery element rows 2b, 2b, etc., are arranged in a plane with translucent portions 22, 22, etc., therebetween. Then, the solar battery element rows 2a are superposed on the translucent portions 22, and the solar battery element rows 2b on the translucent portions 21, respectively. Further, a frame body 5 has a rotation shaft 5a, and therefore the frame body is set in a window frame 6 in a manner being swivable about the rotation shaft 5a.



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CLAIMS

[Claim(s)]

[Claim 1] The 1st solar battery element group which separates a translucent part and comes to arrange the solar battery element of the double-sided generation-of-electrical-energy mold of two or more sheets superficially, The 2nd solar battery element group which separates a translucent part for the solar battery element of two or more sheets which the whole surface contributes to a generation of electrical energy at least, and it comes to arrange superficially The solar cell module characterized by separating distance suitably, and arranging and becoming so that the solar battery element of said 1st solar battery element group may lap with the translucent part of said 2nd solar battery element group and the translucent part of said 1st solar battery element group may lap with the side [the solar battery element of said 2nd solar battery element group] which can be generated.

[Claim 2] The solar cell module according to claim 1 characterized by the area of said solar battery element being smaller than the area of said translucent part.

[Claim 3] The solar cell module according to claim 1 or 2 characterized by coming to infix the thermal break of translucency between said 1st solar battery element groups and said 2nd solar battery element groups.

[Claim 4] Aperture structure characterized by having installed the solar cell module given in any [claim 1 thru/or] of 3 they are rockable.

[Claim 5] The solar battery element group which separates a translucent part and comes to arrange the solar battery element of the double-sided generation-of-electrical-energy mold of two or more sheets superficially, The solar battery element group said whose solar battery element is a solar battery element which the whole surface contributes to a generation of electrical energy at least is used. Aperture structure characterized by having turned to the same field side the side [the solar battery element group of two groups] which can be generated, having arranged the solar battery element of one of said solar battery element group in the location equivalent to the translucent part of said solar battery element group of another side, and arranging the solar battery element group of said two groups in the shape of a sliding door.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a solar cell module and aperture structure equipped with a lighting function.

[0002]

[Description of the Prior Art] The solar cell module equipped with the lighting function is used for aperture material or skylight material. Drawing 8 is drawing of longitudinal section showing the configuration of the conventional solar cell module equipped with a lighting function.

[0003] 20 in drawing is a solar battery element, and separates and arranges spacing which becomes the translucent parts 23 and 23 for making sunrays penetrate, and — about these solar battery elements 20 and 20 of several — dozens of sheets, and —. It determines in consideration of these translucent parts 23 and 23 and the amount of lighting of — which needs area. Said solar battery elements 20 and 20 and — are connected to a serial or juxtaposition using wiring 7 so that it may be possible to connect with the terminal box which takes out these solar battery elements 20 and 20 and the power which — generated.

[0004] Said connected solar battery elements 20 and 20 and — are inserted with the synthetic resin 3 (for example, EVA resin sheet) of translucency. Make the translucent plate [outside / the] 1 using the tempered glass material of translucency into the side which can be generated, and it inserts with this translucent plate 1 and the light transmission film 4 using transparence plastic film. Thermocompression bonding processing is performed, and a bridge is constructed, synthetic resin 3 is hardened, it unifies, the periphery section of a translucent plate 1 and the light transmission film 4 is inserted in the frame 5 using aluminum, and it is considering as the solar cell module.

[0005] When using the above solar cell modules as aperture material, a translucent plate 1 side is turned to sunrays 8, and is used longitudinally. Although solar battery elements 20 and 20 and — are intercepted to a generation of electrical energy using sunrays 8 at this time, since a translucent plate 1 and the light transmission film 4 are made to penetrate, without almost attenuating sunrays 8, translucent parts 23 and 23 and the lighting of them from — are attained.

[0006]

[Problem(s) to be Solved by the Invention] However, the conventional solar cell module equipped with a lighting function had the problem that the rate of the solar battery elements 20 and 20 and — to the area of a solar cell module that area occupies was restricted, and generating efficiency was low in order to prepare translucent parts 23 and 23 and —.

[0007] The 1st solar battery element group which is made in order that this invention may solve this problem, separates the translucent part which penetrates sunrays using the solar battery element of a double-sided generation-of-electrical-energy mold, and comes to arrange said solar battery element of two or more sheets superficially. Between the 2nd solar battery element groups which separate a translucent part and it comes to arrange superficially, at least the solar battery element of two or more sheets which the whole surface contributes to a generation of electrical energy By carrying out opposing the side which can be generated, separating proper spacing, and arranging the solar battery element of the 1st solar battery element group, and the solar battery element of the 2nd solar battery element group by turns The sunrays which generating efficiency improved and penetrated the translucent part aim at offering the solar cell module contributed to lighting.

[0008] Moreover, other purposes of this invention are larger than the area of the solar battery element of the 2nd solar battery element group in the area of the translucent part of the 1st solar battery element group, and are by preparing more greatly than the area of the solar battery element of the 1st solar battery element group the area of the translucent part of the 2nd solar battery element group to offer the solar cell module which can increase the amount of lighting. Moreover, other purposes of this invention are by having the thermal break of translucency between the 1st solar battery element group and the 2nd solar battery element group to offer the solar cell module which is excellent in adiabatic and has a lighting function.

[0009] Moreover, other purposes of this invention aim at offering the aperture structure where an angular relation-ship with sunrays is adjusted, generating efficiency is raised and the amount of lighting can be adjusted by installing a solar cell module rockable. Moreover, other purposes of this invention aim at offering the aperture structure where the physical relationship of a solar battery element group and a solar battery element group is adjusted, and the amount of lighting can be adjusted by installing the solar battery element group of two groups in the shape of a sliding door.

[0010]

[Means for Solving the Problem] The 1st solar battery element group which the solar cell module concerning the 1st invention separates a translucent part for the solar battery element of the double-sided generation-of-electrical-energy mold of two or more sheets, and it comes to arrange superficially. The 2nd solar battery element group which separates a translucent part for the solar battery element of two or more sheets which the whole surface contributes to a generation of electrical energy at least, and it comes to arrange superficially It is characterized by separating distance suitably, and arranging and becoming so that the solar battery element of said 1st solar battery element group may lap with the translucent part of said 2nd solar battery element group and the translucent part of said 1st solar battery element group may lap with the side [the solar battery element of said 2nd solar battery element group] which can be generated.

[0011] The solar cell module concerning the 2nd invention is characterized by the area of said solar battery element being smaller than

the area of said translucent part. It is characterized by the solar cell module concerning the 3rd invention coming to infix the thermal break of translucency between said 1st solar battery element groups and said 2nd solar battery element groups. Aperture structure concerning the 4th invention is characterized by having installed the solar cell module given in any [claim 1 thru/or] of 3 they are rockable.

[0012] The solar battery element group whose aperture structure concerning the 5th invention separates a translucent part for the solar battery element of the double-sided generation-of-electrical-energy mold of two or more sheets, and comes to arrange it superficially. The solar battery element group said whose solar battery element is a solar battery element which the whole surface contributes to a generation of electrical energy at least is used. It is characterized by having turned to the same field side the side [the solar battery element group of two groups] which can be generated, having arranged the solar battery element of one of said solar battery element group in the location equivalent to the translucent part of said solar battery element group of another side, and arranging the solar battery element group of said two groups in the shape of a sliding door.

[0013] If it was in the 1st invention, when the 1st solar battery element group side is turned to sunrays. Some sunrays which carried out incidence carry out incidence to the front face of the solar battery element of the 1st solar battery element group, and it contributes to a generation of electrical energy. The remainder of said sunrays penetrates the translucent part of the 1st solar battery element group, carries out incidence to the front face of the solar battery element of the 2nd solar battery element group, and contributes to a generation of electrical energy. Some sunrays reflected on the front face of the solar battery element of the 2nd solar battery element group carry out incidence to the rear face of the solar battery element of the 1st solar battery element group, and it contributes to a generation of electrical energy. Some sunrays reflected with the rear face of the solar battery element of the 1st solar battery element group penetrate the translucent part of the 2nd solar battery element group, and it contributes to lighting of borrowed light. Moreover, some sunrays which penetrated the translucent part of the 1st solar battery element group can penetrate the translucent part of the 2nd solar battery element group, it can contribute to lighting of *****, can raise generating efficiency, and can be equipped with a lighting function.

[0014] Moreover, when using the solar battery element of a double-sided generation-of-electrical-energy mold also for the 2nd solar battery element group and using as aperture material, the light from an indoor side can carry out incidence to the rear face of the 2nd solar battery element group, can contribute to a generation of electrical energy, and can raise generating efficiency.

[0015] If it is in the 2nd invention, the area of the translucent part of the 1st solar battery element group is larger than the area of the solar battery element of the 2nd solar battery element group, and since the translucent part of the 1st solar battery element group and the translucent part of the 2nd solar battery element group lap by preparing more greatly than the area of the solar battery element of the 1st solar battery element group the area of the translucent part of the 2nd solar battery element group, the amount of lighting of ***** increases. If it is in the 3rd invention, it can use as aperture material which is excellent in adiathermic.

[0016] If it is in the 4th invention, it can use as an aperture which can be opened and closed by rocking, and the angular relationship of the 1st solar battery element group and the 2nd solar battery element group, and sunrays is adjusted, generating efficiency can be raised and the amount of lighting can be adjusted. If it is in the 5th invention, it can use as an aperture which can be opened and closed by being displaced relatively, adjustment of the physical relationship of a solar battery element and a translucent part is attained, and the amount of lighting can be adjusted.

[0017]

[Embodiment of the Invention] Hereafter, this invention is explained in full detail based on the drawing in which the gestalt of the operation is shown.

Gestalt of operation The top view and drawing 2 which show the configuration of the solar cell module which 1. drawing 1 requires for the gestalt 1 of operation of this invention are the sectional view of the II-II line of drawing 1.

[0018] Two in drawing is the solar battery element (for example, HIT solar battery element) of a rectangular double-sided generation-of-electrical-energy mold. Approach, and superficially, in a longitudinal direction, carry out single-tier arrangement and the solar battery elements 2 and 2 of several - dozens of sheets and -- are made into the solar battery element trains 2a and 2a and --. Spacing which becomes the translucent parts 21 and 21 which penetrate sunrays 8, and -- about two or more solar battery element trains 2a and 2a and -- is separated to a lengthwise direction, and it juxtaposes superficially, and comes to make it rectangular solar battery element group 20a as a whole. Similarly, said solar battery elements 2 and 2 and -- are approached, and superficially, spacing which carries out single-tier arrangement, considers as solar battery element train 2b, 2b, and -- in a longitudinal direction, and becomes translucent parts 22 and 22 and -- about two or more solar battery element train 2bs, 2b, and -- is separated to a lengthwise direction, and it juxtaposes superficially, and comes to make it rectangular solar battery element group 20b as a whole.

[0019] The die length of translucent parts 21 and 21, -- and translucent parts 22 and 22, and the lengthwise direction of -- is prepared so that it may become equal [solar battery element train 2b, 2b, -- and the solar battery element trains 2a and 2a, and --] to the die length of a lengthwise direction, respectively.

[0020] Solar battery element group 20a and solar battery element group 20b Between the translucent plate 1 using the tempered glass material of rectangular translucency, and this translucent plate 1 and the light transmission film 4 using the transparence plastic film of the isomorphism-like said area, with the synthetic resin 3 (for example, EVA resin) of translucency, make solar battery element group 20a into a translucent plate 1 side, and it is closed. Translucent parts 21 and 21, -- and translucent parts 22 and 22, and -- It was formed with synthetic resin 3, respectively between solar battery element train 2a and solar battery element train 2a and between solar battery element train 2b and solar battery element train 2b, and the periphery section of said translucent plate 1 and the light transmission film 4 is inserted in the frame 5 using aluminum.

[0021] At this time, solar battery element group 20a and solar battery element group 20b are arranged by turns so that intervene synthetic resin 3, and may separate a distance longer than the thickness of a solar battery element 2, a laminating may be carried out, the solar battery element trains 2a and 2a and -- may lap with translucent parts 22 and 22 and -- and translucent parts 21 and 21 and -- may lap with solar battery element train 2b, 2b, and --.

[0022] In addition, the distance between solar battery element group 20a and solar battery element group 20b is determined in consideration of the relation between the thickness of a solar cell module, the amount of generations of electrical energy, and the amount of lighting etc. Although a solar cell module becomes thin when said distance is made small The amount of translucent parts 21 and 21 and the sunrays 8 which penetrate -- and penetrate translucent parts 22 and 22 and -- decreases, and the amount of lighting of ***** decreases. Reflect on solar battery element train 2b, 2b, and the front face of --, the amount of the solar battery element

trains 2a and 2a and the sunrays 8 of — which carry out incidence to a rear face decreases, and the amount of generations of electrical energy decreases. The amount of the solar battery element trains 2a and 2a and the sunrays 8 of — which reflect with the rear face and penetrate translucent parts 22 and 22 and — decreases, and the amount of lighting of borrowed light decreases.

[0023] Moreover, it connects with a serial or juxtaposition using wiring 7 (for example, copper plate lead wire for connection which carried out solder plating at the copper plate), and solar battery elements 2 and 2 and — are connected to the terminal box 9 for taking out solar battery elements 2 and 2 and the power which — generated through this wiring 7. Said frame 5 equips the end section side of the lengthwise direction of a lateral both-sides side with the revolving shafts 5a and 5a which project in a longitudinal direction. Moreover, the light transmission film 4 side near the other end is equipped with tilt-angle maintenance rod 5c which projects in an indoor side when it uses as aperture material.

[0024] When using the above solar cell modules as aperture material, a translucent plate 1 side is turned to sunrays 8 by making the revolving-shaft 5a side into the bottom, and it inserts in a window frame 6, and said revolving shafts 5a and 5a are inserted, and it attaches in the bearing which was prepared near the upper limit section of the inside section of the longitudinal direction of this window frame 6 and which is not illustrated possible [rocking (closing motion)], and uses for it. It has tilt-angle controller 6c near the lower limit section of the longitudinal direction inside section of a window frame 6, this tilt-angle controller 6c has the stopper of the shape of some hole, and the tilt angle of a solar cell module is adjusted and held by inserting the end of tilt-angle maintenance rod 5c in this stopper, and a solar cell module is supported.

[0025] Although the solar battery element trains 2a and 2a and the front face of — are intercepted to a generation of electrical energy using sunrays 8 at this time A translucent plate 1 and the light transmission film 4 are made to penetrate, without almost attenuating sunrays 8. Carry out incidence of translucent parts 21 and 21 and some sunrays 8 which carried out incidence from — to solar battery element train 2b, 2b, and the front face of —, and they contribute to a generation of electrical energy. The remainder of said sunrays 8 is reflected on solar battery element train 2b, 2b, and the front face of —, and since [of the solar battery element trains 2a and 2a and —] incidence is carried out to a rear face and it contributes to a generation of electrical energy, said solar cell module can raise generating efficiency.

[0026] Moreover, some of solar battery element train 2bs, 2bs, and the front face, the solar battery element trains 2a and 2a and the sunrays 8 of — reflected between rear faces of — penetrate translucent parts 22 and 22 and —, and it contributes to lighting of borrowed light. Since translucent parts 21 and 21 and some sunrays 8 which penetrated — penetrate the direct translucent parts 22 and 22 and — and they contribute to lighting of ***** when sunrays 8 carry out incidence aslant, as for said solar cell module, a lighting function can be used effectively.

[0027] Moreover, in order to prevent a solar battery element and a solar battery element contacting and short-circuiting conventionally, the solar cell module which separated spacing for contact prevention is between solar battery elements. The solar cell module of this invention has separated said distance between solar battery element train 2a and solar battery element train 2b, and when translucent parts 21 and 21, — or translucent parts 22 and 22, and — exist between solar battery element train 2a and solar battery element train 2a or between solar battery element train 2b and solar battery element train 2b, it does not need to separate spacing for contact prevention prepared conventionally. Therefore, the rate that the area of the solar battery element to the area of a solar cell module occupies increases, and generating efficiency improves.

[0028] Furthermore, said solar cell module can be adjusted at the include angle from which the optimal amount of lighting, the amount of generations of electrical energy, etc. are obtained by making it rock as a shaft according to sun elevation in revolving shafts 5a and 5a. For example, it can have a lighting function, without translucent parts 22 and 22 and — preventing ***** carrying out incidence indoors by [of the solar battery element trains 2a and 2a and —] adjusting so that it may be covered with a shadow, and improving lightning in borrowed light, and the amount of generations of electrical energy decreasing by lighting. Or lightning can be improved in ***** by adjusting so that sunrays 8 may carry out incidence to translucent parts 22 and 22 and —. Moreover, since solar battery element train 2b, 2b, and — lap with translucent parts 21 and 21 and —, it makes it difficult to see through indoor from an outdoors side.

[0029] In addition, an axis of ordinate may be set as revolving-shaft 5a, and it may be attached possible [rocking (closing motion)]. At this time, the solar battery element trains 2a and 2a, — and solar battery element train 2b, 2b, and — may be made into a column. When such a solar cell module is used as aperture material of the east side of a house, according to whenever [incident angle / of sunrays 8], the amount of generations of electrical energy and the amount of lighting can be adjusted easily. Moreover, although the light by the side of indoor can also be generated since the solar battery element trains 2a and 2a, — and solar battery element train 2b, 2b, and — are double-sided generation-of-electrical-energy molds, an one side generation-of-electrical-energy mold is sufficient as solar battery element train 2b, 2b, and —. At this time, solar battery element train 2b, 2b, and — turn to solar battery element trainsa [2] and 2a and — side the side which can be generated, and arrange it.

[0030] Moreover, the die length of translucent parts 21 and 21, — and translucent parts 22 and 22, and the lengthwise direction of — may be prepared so that it may become longer [solar battery element train 2b, 2b, — and the solar battery element trains 2a and 2a, and —] than the die length of a lengthwise direction, respectively. In this case, translucent parts 21 and 21, — and translucent parts 22 and 22, and the amount of lighting of ***** which penetrates — increase.

[0031] Gestalt of operation The top view and drawing 4 which show the configuration of the solar cell module which 2. drawing 3 requires for the gestalt 2 of operation of this invention are the sectional view of the IV-IV line of drawing 3.

[0032] Two in drawing is the solar battery element (for example, HIT solar battery element) of a rectangular double-sided generation-of-electrical-energy mold. Approach, and superficially, in a longitudinal direction, carry out single-tier arrangement and the solar battery elements 2 and 2 of several - dozens of sheets and — are made into the solar battery element trains 2a and 2a and —. Spacing which becomes the translucent parts 21 and 21 which penetrate sunrays 8, and — about two or more solar battery element trains 2a and 2a and — is separated to a lengthwise direction, and it juxtaposes superficially, and comes to make it rectangular solar battery element group 20a as a whole. The synthetic resin 3 of translucency is used for this solar battery element group 20a between the rectangular translucent plate 1, and this translucent plate 1 and the light transmission film 4 of the isomorphism-like said area, and it has carried out the laminating to it. Translucent parts 21 and 21 and — are formed with synthetic resin 3 between solar battery element train 2a and solar battery element train 2a.

[0033] Similarly, approach, and superficially, in a longitudinal direction, carry out single-tier arrangement and said solar battery elements 2 and 2 and — are made into solar battery element train 2b, 2b, and —. Spacing which becomes translucent parts 22 and 22 and —

about two or more solar battery element train 2bs, 2b, and — is separated to a lengthwise direction, and it juxtaposes superficially, and is made rectangular solar battery element group 20b as a whole, and synthetic resin 3 is used between a translucent plate 1 and the light transmission film 4, and the laminating has been carried out to it. Translucent parts 22 and 22 and — are formed with synthetic resin 3 between solar battery element train 2b and solar battery element train 2b. The die length of translucent parts 21 and 21, — and translucent parts 22 and 22, and the lengthwise direction of — is provided so that it may become longer [solar battery element train 2b, 2b, — and the solar battery element trains 2a and 2a, and —] than the die length of a lengthwise direction, respectively.

[0034] The frame 5 using aluminum is equipped with the part which keeps a proper distance between solar battery element group 20a and solar battery element group 20b, and inserts the translucent plate 1 of solar battery element group 20a or solar battery element group 20b, and the periphery section of the light transmission film 4 in it, respectively. It is inserted in a frame 5 and a solar cell module becomes so that the solar battery element groups 20a and 20b may be carried out to oppose each light transmission film 4 of these solar battery element groups 20a and 20b, translucent parts 22 and 22 and — may lap with the solar battery element trains 2a and 2a and — and translucent parts 21 and 21 and — may lap with solar battery element train 2b, 2b, and —. At this time, air is sealed between each light transmission film 4 of the solar battery element groups 20a and 20b, and it becomes a thermal break 51.

[0035] It connects with a serial or juxtaposition using wiring 7 (for example, copper plate lead wire for connection which carried out solder plating at the copper plate), respectively, and the solar battery element trains 2a and 2a, — and solar battery element train 2b, 2b, and — are connected to the terminal box 9 for taking out solar battery elements 2 and 2 and the power which — generated through this wiring 7, respectively. When using the above solar cell modules as aperture material, the solar battery element group 20a side is turned to sunrays 8, and it is used. At this time, like the gestalt 1 of operation, said solar cell module raises generating efficiency, and can use a lighting function effectively.

[0036] Moreover, although translucent parts 22 and 22 and — have put [— / translucent parts 21 and 21 and] on the solar battery element trains 2a and 2a and — with solar battery element train 2b, 2b, and —, respectively. Rather than solar battery element train 2b and solar battery element train 2a, since it is large to a lengthwise direction, translucent parts 22 and 22 and — lap with translucent parts 21 and 21 and —, and as for a translucent part 21 and a translucent part 22, for this reason, the outdoors can be seen through from the increase [of the amount of lighting] and indoor side of *****, respectively. Moreover, said solar cell module is excellent in adiabatic with the adiabatic efficiency of a thermal break 51, and excellent also in insulation.

[0037] In addition, although a solar cell module becomes thick when distance between solar battery element group 20a and solar battery element group 20b is lengthened. The amount of translucent parts 21 and 21 and the sunrays 8 which penetrate — and penetrate translucent parts 22 and 22 and — increases, and the amount of lighting of ***** increases. Reflect on solar battery element train 2b, 2b, and the front face of —, and the solar battery element trains 2a and 2a and the amount of the sunrays 8 which carry out incidence to a rear face of — increase, and the amount of generations of electrical energy increases. The amount of the solar battery element trains 2a and 2a and the sunrays 8 of — which reflect with the rear face and penetrate translucent parts 22 and 22 and — increases, and the amount of lighting of borrowed light increases. Furthermore, since the amount of the air sealed by the thermal break 51 increases, adiabatic efficiency and an effect of intercepting noise also increase. Said solar cell module may be inserted in, and may be used as an aperture of murder, and may be used as an aperture in which closing motion by rocking is possible like the gestalt 1 of operation.

[0038] Gestalt of operation For the top view and drawing 6 which show the configuration of the aperture structure which 3. drawing 5 requires for the gestalt 3 of operation of this invention, the sectional view of the VI-VI line of drawing 5 and drawing 7 are VII-VII of drawing 5. It is the sectional view of a line.

[0039] Although the solar battery element groups 20a and 20b inserted into the translucent plate 1 and the light transmission film 4 are installed in a frame 5 and it unifies fixed with the gestalt 2 of operation mentioned above, with the aperture structure of the gestalt 3 of operation, said solar battery element group 20a and said solar battery element group 20b are inserted in a frame 50, respectively, and it attaches in a window frame 6 by carrying out at the shape of a sliding door, respectively. The wheel sections 5b and 5b and — which assist the both-way migration on rail section 6b and 6b are attached to the both ends of the lengthwise direction of each frame 50 two or more picking in consideration of the weight of said solar battery element group 20a or solar battery element group 20b, friction, etc., respectively.

[0040] A window frame 6 keeps a proper distance in the depth direction, and equips both the insides section of a lengthwise direction with 2 sets of rail sections 6b and 6b for attaching a frame 50 movable. The rail sections 6b and 6b and — are prepared in the respectively same die length as the inside distance of the longitudinal direction of a window frame 6.

[0041] The wheel sections 5b and 5b of the wheel sections 5b and 5b of solar battery element group 20a, —, solar battery element group 20b and — are put on the rail sections 6b and 6b and —, and a solar cell module becomes them, as the light transmission film 4 of solar battery element group 20a and the translucent plate 1 of solar battery element group 20b become facing each other. In addition, the same sign is given to the same part as the gestalt 2 of operation, and those explanation is omitted.

[0042] The above aperture structures turn the translucent plate 1 of solar battery element group 20a to sunrays 8, move suitably solar battery element group 20a or solar battery element group 20b like a sliding door-like aperture, and are used.

[0043] Said aperture structure can be opened and closed in the shape of a sliding door. When an aperture is shut, incidence of the sunrays 8 is carried out to the solar battery element trains 2a and 2a, — and solar battery element train 2b, 2b, and the front face of —, and they contribute to a generation of electrical energy. Since solar battery element group 20a and solar battery element group 20b do not lap at this time, Since it is lost that it is lost that translucent parts 21 and 21 and the sunrays 8 which penetrated — are covered by solar battery element train 2b, 2b, and —, and the solar battery element trains 2a and 2a and — cover translucent parts 22 and 22 and —, Sunrays 8 can be made to be able to penetrate and the amount of lighting of ***** can be made to increase. Moreover, since solar battery element train 2a laps with a translucent part 22 and solar battery element train 2b laps with a translucent part 21 although solar battery element group 20a and solar battery element group 20b will lap when an aperture is opened, like the gestalt 2 of operation, said solar cell module can raise generating efficiency, and can be equipped with a lighting function.

[0044]

[Effect of the Invention] The 1st solar battery element group which according to the solar cell module of this invention separates the translucent part which penetrates sunrays using the solar battery element of a double-sided generation-of-electrical-energy mold, and comes to arrange said solar battery element of two or more sheets superficially, Between the 2nd solar battery element groups which separate a translucent part and it comes to arrange superficially, at least the solar battery element of two or more sheets which the

whole surface contributes to a generation of electrical energy By carrying out opposing the side which can be generated, separating proper spacing, and arranging the solar battery element of the 1st solar battery element group, and the solar battery element of the 2nd solar battery element group by turns When the 1st solar battery element group side is turned to sunrays, some sunrays which carried out incidence carry out incidence to the front face of the solar battery element of the 1st solar battery element group, and it contributes to a generation of electrical energy. The remainder of said sunrays penetrates the translucent part of the 1st solar battery element group, carries out incidence to the front face of the solar battery element of the 2nd solar battery element group, and contributes to a generation of electrical energy. Some sunrays reflected on the front face of the solar battery element of the 2nd solar battery element group carry out incidence to the rear face of the solar battery element of the 1st solar battery element group, and it contributes to a generation of electrical energy. Some sunrays reflected with the rear face of the solar battery element of the 1st solar battery element group penetrate the translucent part of the 2nd solar battery element group, and it contributes to lighting of borrowed light. Moreover, some sunrays which penetrated the translucent part of the 1st solar battery element group can penetrate the translucent part of the 2nd solar battery element group, it can contribute to lighting of *****, can raise generating efficiency, and can be equipped with a lighting function.

[0045] Moreover, when using the solar battery element of a double-sided generation-of-electrical-energy mold also for the 2nd solar battery element group and using as aperture material, the light from an indoor side can carry out incidence to the rear face of the 2nd solar battery element group, can contribute to a generation of electrical energy, and can raise generating efficiency. Moreover, it is larger than the area of the solar battery element of the 2nd solar battery element group in the area of the translucent part of the 1st solar battery element group, and since the translucent part of the 1st solar battery element group and the translucent part of the 2nd solar battery element group lap by preparing more greatly than the area of the solar battery element of the 1st solar battery element group the area of the translucent part of the 2nd solar battery element group, the amount of lighting of ***** increases. Moreover, it can use as aperture material which is excellent in adiathermic by having the thermal break of translucency between the 1st solar battery element group and the 2nd solar battery element group.

[0046] Moreover, by installing a solar cell module rockable, by rocking, it can use as an aperture whose closing motion is attained, and the angular relation-ship of the 1st solar battery element group and the 2nd solar battery element group, and sunrays is adjusted, generating efficiency can be raised and, according to the aperture structure of this invention, the amount of lighting can be adjusted. Furthermore, according to the aperture structure of this invention, this invention does the outstanding effectiveness so by installing the solar battery element group of two groups in the shape of a sliding door — it can use as an aperture which can be opened and closed by being displaced relatively, adjustment of the physical relationship of a solar battery element and a translucent part is attained, and the amount of lighting can be adjusted.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view showing the configuration of the solar cell module concerning the gestalt 1 of operation of this invention.

[Drawing 2] It is the sectional view of the II-II line of drawing 1 .

[Drawing 3] It is the top view showing the configuration of the solar cell module concerning the gestalt 2 of operation of this invention.

[Drawing 4] It is the sectional view of the IV-IV line of drawing 3 .

[Drawing 5] It is the top view showing the configuration of the aperture structure concerning the gestalt 3 of operation of this invention.

[Drawing 6] It is the sectional view of the VI-VI line of drawing 5 .

[Drawing 7] VII-VII of drawing 5 It is the sectional view of a line.

[Drawing 8] It is drawing of longitudinal section showing the configuration of the conventional solar cell module equipped with a lighting function.

[Description of Notations]

2 Solar Battery Element

2a Solar battery element train

21 Translucent Part

2b Solar battery element train

22 Translucent Part

20a Solar battery element group

20b Solar battery element group

5a Revolving shaft

5b Wheel section

51 Thermal Break

6b Rail section

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(54)【発明の名称】 太陽電池モジュール及び窓構造

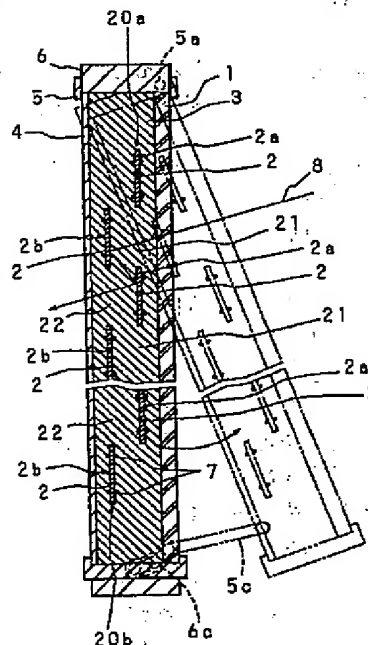
(57)【要約】

【課題】 発電効率を向上させ、採光機能を備える太陽電池モジュール及び窓構造を提供することを目的とする。

【解決手段】 透光部21、21、…を隔てて平面的に配置した両面発電型の太陽電池素子列2a、2a、…と、同じく透光部22、22、…を隔てて平面的に配置した太陽電池素子列2b、2b、…とを、各太陽電池素子列2aと透光部22、太陽電池素子列2bと透光部21とを重ねて配置する。また、枠体5に回転軸5aを設けて窓枠6に揺動可能に設置する。

(屋内)

(屋外)



【特許請求の範囲】

【請求項1】 複数枚の両面発電型の太陽電池素子を、透光部を隔てて平面的に配置してなる第1太陽電池素子群と、少なくとも一面が発電に寄与する複数枚の太陽電池素子を、透光部を隔てて平面的に配置してなる第2太陽電池素子群とを、前記第1太陽電池素子群の太陽電池素子が前記第2太陽電池素子群の透光部に重なり、前記第1太陽電池素子群の透光部が前記第2太陽電池素子群の太陽電池素子の発電可能側に重なるように、適宜距離を隔てて配置してなることを特徴とする太陽電池モジュール。

【請求項2】 前記太陽電池素子の面積が前記透光部の面積より小さいことを特徴とする請求項1に記載の太陽電池モジュール。

【請求項3】 前記第1太陽電池素子群と前記第2太陽電池素子群との間に透光性の断熱層を介装してなることを特徴とする請求項1又は2に記載の太陽電池モジュール。

【請求項4】 請求項1乃至3の何れかに記載の太陽電池モジュールを揺動可能に設置してあることを特徴とする窓構造。

【請求項5】 複数枚の両面発電型の太陽電池素子を、透光部を隔てて平面的に配置してなる太陽電池素子群と、前記太陽電池素子が、少なくとも一面が発電に寄与する太陽電池素子である太陽電池素子群とを用い、2群の太陽電池素子群の発電可能側を同一面側に向けて、一方の前記太陽電池素子群の太陽電池素子を他方の前記太陽電池素子群の透光部に相当する位置に布置して、前記2群の太陽電池素子群を引き戸状に配置していることを特徴とする窓構造。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、採光機能を備える太陽電池モジュール及び窓構造に関する。

【0002】

【従来の技術】採光機能を備えた太陽電池モジュールは窓材又は天窗材等に用いられる。図8は、採光機能を備える従来の太陽電池モジュールの構成を示す縦断面図である。

【0003】図中20は太陽電池素子であり、数枚～数十枚の該太陽電池素子20、20、…を太陽光線を透過させるための透光部23、23、…となる間隔を隔てて配置している。該透光部23、23、…の面積は必要な採光量を考慮し決定する。前記太陽電池素子20、20、…は、該太陽電池素子20、20、…が発生させた電力を取り出す端子箱に接続することが可能なように、配線7を用いて直列又は並列に接続されている。

【0004】接続された前記太陽電池素子20、20、…は透光性の合成樹脂3（例えばEVA樹脂シート）で挟み、その外側を、透光性の強化ガラス材を用いた透光

板1を発電可能側にして該透光板1と透明プラスチックフィルムを用いた透光フィルム4とで挟み、熱圧着加工を施し、合成樹脂3を架橋、硬化して一体化し、透光板1及び透光フィルム4の周縁部をアルミニウムを用いた枠体5に嵌め込んで太陽電池モジュールとしている。

【0005】以上のような太陽電池モジュールを窓材として用いる場合、透光板1側を太陽光線8に向けて縦置きに用いる。このとき、太陽電池素子20、20、…は太陽光線8を発電に利用して遮断するが、透光板1及び透光フィルム4は太陽光線8をほとんど減衰させることなく透過させるため、透光部23、23、…からの採光が可能となる。

【0006】

【発明が解決しようとする課題】しかしながら、採光機能を備える従来の太陽電池モジュールは、透光部23、23、…を設けるため太陽電池モジュールの面積に対する太陽電池素子20、20、…の面積の占める割合が制限されて発電効率が低いという問題があった。

【0007】本発明は斯かる問題を解決するためになされたものであり、両面発電型の太陽電池素子を用い、太陽光線を透過する透光部を隔てて複数枚の前記太陽電池素子を平面的に配置してなる第1太陽電池素子群と、少なくとも一面が発電に寄与する複数枚の太陽電池素子を透光部を隔てて平面的に配置してなる第2太陽電池素子群との間に、発電可能側を向かい合わせにして適宜の間隔を隔て、第1太陽電池素子群の太陽電池素子と第2太陽電池素子群の太陽電池素子とを交互に配置することにより、発電効率が向上し、また、透光部を透過した太陽光線が採光に寄与する太陽電池モジュールを提供することを目的とする。

【0008】また、本発明の他の目的は、第1太陽電池素子群の透光部の面積を第2太陽電池素子群の太陽電池素子の面積より大きく、第2太陽電池素子群の透光部の面積を第1太陽電池素子群の太陽電池素子の面積より大きく設けることにより、採光量を増すことができる太陽電池モジュールを提供することにある。また、本発明の他の目的は、第1太陽電池素子群と第2太陽電池素子群との間に透光性の断熱層を備えることにより、断熱性に優れて採光機能を有する太陽電池モジュールを提供することにある。

【0009】また、本発明の他の目的は、太陽電池モジュールを揺動可能に設置することにより、太陽光線との角度関係を調節して、発電効率を向上させ採光量が調節できる窓構造を提供することを目的とする。また、本発明の他の目的は、2群の太陽電池素子群を引き戸状に設置することにより、太陽電池素子群と太陽電池素子群との位置関係を調節して採光量が調節できる窓構造を提供することを目的とする。

【0010】

【課題を解決するための手段】第1発明に係る太陽電池

モジュールは、複数枚の両面発電型の太陽電池素子を、透光部を隔てて平面的に配置してなる第1太陽電池素子群と、少なくとも一面が発電に寄与する複数枚の太陽電池素子を、透光部を隔てて平面的に配置してなる第2太陽電池素子群とを、前記第1太陽電池素子群の太陽電池素子が前記第2太陽電池素子群の透光部に重なり、前記第1太陽電池素子群の透光部が前記第2太陽電池素子群の太陽電池素子の発電可能側に重なるように、適宜距離を隔てて配置してなることを特徴とする。

【0011】第2発明に係る太陽電池モジュールは、前記太陽電池素子の面積が前記透光部の面積より小さいことを特徴とする。第3発明に係る太陽電池モジュールは、前記第1太陽電池素子群と前記第2太陽電池素子群との間に透光性の断熱層を介装してなることを特徴とする。第4発明に係る窓構造は、請求項1乃至3の何れかに記載の太陽電池モジュールを揺動可能に設置してあることを特徴とする。

【0012】第5発明に係る窓構造は、複数枚の両面発電型の太陽電池素子を、透光部を隔てて平面的に配置してなる太陽電池素子群と、前記太陽電池素子が、少なくとも一面が発電に寄与する太陽電池素子である太陽電池素子群とを用い、2群の太陽電池素子群の発電可能側を同一面側に向けて、一方の前記太陽電池素子群の太陽電池素子を他方の前記太陽電池素子群の透光部に相当する位置に布置して、前記2群の太陽電池素子群を引き戸状に配置していることを特徴とする。

【0013】第1発明にあっては、第1太陽電池素子群側を太陽光線に向けたとき、入射した太陽光線の一部が第1太陽電池素子群の太陽電池素子の表面に入射して発電に寄与し、前記太陽光線の残部が第1太陽電池素子群の透光部を透過して第2太陽電池素子群の太陽電池素子の表面に入射して発電に寄与して、第2太陽電池素子群の太陽電池素子の表面で反射した太陽光線の一部が第1太陽電池素子群の太陽電池素子の裏面に入射して発電に寄与し、第1太陽電池素子群の太陽電池素子の裏面で反射した太陽光線の一部が第2太陽電池素子群の透光部を透過して間接光の採光に寄与し、また、第1太陽電池素子群の透光部を透過した太陽光線の一部が第2太陽電池素子群の透光部を透過して直達光の採光に寄与して、発電効率を向上させて採光機能を備えることができる。

【0014】また、第2太陽電池素子群にも両面発電型の太陽電池素子を用いて窓材として用いる場合、屋内側からの光が第2太陽電池素子群の裏面に入射して発電に寄与し、発電効率を向上させることができる。

【0015】第2発明にあっては、第1太陽電池素子群の透光部の面積が第2太陽電池素子群の太陽電池素子の面積より大きく、第2太陽電池素子群の透光部の面積が第1太陽電池素子群の太陽電池素子の面積より大きく設けられていることにより、第1太陽電池素子群の透光部と第2太陽電池素子群の透光部とが重なるため、直達光

の採光量が増大する。第3発明にあっては、断熱性に優れた窓材として用いることができる。

【0016】第4発明にあっては、揺動することによって開閉可能な窓として用いることができ、第1太陽電池素子群及び第2太陽電池素子群と太陽光線との角度関係を調節して、発電効率を向上させ、採光量を調節することができる。第5発明にあっては、相対移動することによって開閉可能な窓として用いることができ、太陽電池素子と透光部との位置関係が調整可能となって採光量が調整できる。

【0017】

【発明の実施の形態】以下、本発明をその実施の形態を示す図面に基づいて詳述する。

実施の形態 1. 図1は、本発明の実施の形態1に係る太陽電池モジュールの構成を示す平面図、図2は、図1のII-II線の断面図である。

【0018】図中2は矩形の両面発電型の太陽電池素子（例えばHIT太陽電池素子）であり、数枚～数十枚の太陽電池素子2、2、…を接近して平面的に横方向に1列配置して太陽電池素子列2a、2a、…とし、複数の太陽電池素子列2a、2a、…を、太陽光線8を透過する透光部21、21、…となる間隔を縦方向に隔てて平面的に並置し、全体として矩形の太陽電池素子群20aにしてなる。同様に、前記太陽電池素子2、2、…を接近して平面的に横方向に1列配置して太陽電池素子列2b、2b、…とし、複数の太陽電池素子列2b、2b、…を、透光部22、22、…となる間隔を縦方向に隔てて平面的に並置し、全体として矩形の太陽電池素子群20bにしてなる。

【0019】透光部21、21、…及び透光部22、22、…の縦方向の長さは、夫々太陽電池素子列2b、2b、…及び太陽電池素子列2a、2a、…の縦方向の長さと同しくなるように設けられている。

【0020】太陽電池素子群20a及び太陽電池素子群20bは、矩形の透光性の強化ガラス材を用いた透光板1と、該透光板1と同形状同面積の透明プラスチックフィルムを用いた透光フィルム4との間に透光性の合成樹脂3（例えばEVA樹脂）で太陽電池素子群20aを透光板1側にして封止し、透光部21、21、…及び透光部22、22、…は、太陽電池素子列2aと太陽電池素子列2aとの間、及び太陽電池素子列2bと太陽電池素子列2bとの間に合成樹脂3によって夫々形成され、前記透光板1及び透光フィルム4の周縁部をアルミニウムを用いた枠体5に嵌め込んでいる。

【0021】このとき、太陽電池素子群20a及び太陽電池素子群20bは、合成樹脂3を介在して太陽電池素子2の厚みより長い距離を隔てて積層され、太陽電池素子列2a、2a、…が透光部22、22、…に重なり、透光部21、21、…が太陽電池素子列2b、2b、…に重なるよう交互に配置されている。

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【0022】なお、太陽電池素子群20aと太陽電池素子群20bとの間の距離は、太陽電池モジュールの厚み、発電量及び採光量の関係等を考慮して決定する。前記距離を小さくした場合、太陽電池モジュールは薄くなるが、透光部21、21、…を透過して透光部22、22、…を透過する太陽光線8の量が減少して直達光の採光量が減少し、太陽電池素子列2b、2b、…の表面で反射して太陽電池素子列2a、2a、…の裏面に入射する太陽光線8の量が減少して発電量が減少し、太陽電池素子列2a、2a、…の裏面で反射して透光部22、22、…を透過する太陽光線8の量が減少して間接光の採光量が減少する。

【0023】また、太陽電池素子2、2、…は、配線7（例えば銅板に半田メッキした接続用銅板導線）を用いて直列又は並列に接続され、該配線7を介して、太陽電池素子2、2、…が発生させた電力を取り出すための端子箱9に接続されている。前記枠体5は、横方向に突出する回転軸5a、5aを、横方向の両側面の縦方向の一端部側に備える。また、他端部付近の透光フィルム4側には、窓材として用いたとき屋内側に突出する傾斜角保持棒5cを備える。

【0024】以上のような太陽電池モジュールを窓材として用いる場合、回転軸5a側を上側として透光板1側を太陽光線8に向けて窓枠6に嵌め込み、該窓枠6の横方向の内面部の上端部付近に設けられた図示しない軸受けに前記回転軸5a、5aを挿入して揺動（開閉）可能に取り付けて用いる。窓枠6の横方向内面部の下端部付近には傾斜角調整部6cが備えられ、該傾斜角調整部6cは数個の穴状のストッパを有し、該ストッパに傾斜角保持棒5cの一端を差し込むことで太陽電池モジュールの傾斜角を調整して保持し、また太陽電池モジュールを支持する。

【0025】このとき、太陽電池素子列2a、2a、…の表面は太陽光線8を発電に利用して遮断するが、透光板1及び透光フィルム4は太陽光線8をほとんど減衰させることなく透過させ、透光部21、21、…から入射した太陽光線8の一部は太陽電池素子列2b、2b、…の表面に入射して発電に寄与し、前記太陽光線8の残部は太陽電池素子列2b、2b、…の表面で反射して太陽電池素子列2a、2a、…の裏面に入射して発電に寄与するため、前記太陽電池モジュールは発電効率を向上させることができる。

【0026】また、太陽電池素子列2b、2b、…の表面と太陽電池素子列2a、2a、…の裏面との間で反射した太陽光線8の一部は透光部22、22、…を透過して間接光の採光に寄与し、太陽光線8が斜めに入射した場合は透光部21、21、…を透過した太陽光線8の一部が直接透光部22、22、…を透過して直達光の採光に寄与するため、前記太陽電池モジュールは採光機能を有効に利用できる。

【0027】また、従来、太陽電池素子と太陽電池素子とが接触して短絡することを防ぐため、太陽電池素子と太陽電池素子との間に接触防止用の間隔を隔てた太陽電池モジュールがある。本発明の太陽電池モジュールは、太陽電池素子列2aと太陽電池素子列2bとの間に前記距離を隔てており、太陽電池素子列2aと太陽電池素子列2bとの間又は太陽電池素子列2bと太陽電池素子列2bとの間には透光部21、21、…又は透光部22、22、…が存在することにより、従来設けていた接触防止用の間隔を隔てる必要がない。そのため、太陽電池モジュールの面積に対する太陽電池素子の面積の占める割合が増加して、発電効率が向上する。

【0028】更に、前記太陽電池モジュールを回転軸5a、5aを軸として揺動させることにより、太陽高度に合わせて最適な採光量、発電量等が得られる角度に調節することができる。例えば、透光部22、22、…が太陽電池素子列2a、2a、…の影に覆われるよう調節することにより、直達光が屋内に入射することを防いで間接光を採光し、また、採光によって発電量が減少することなく採光機能を備えることができる。又は、透光部22、22、…に太陽光線8が入射するよう調節することにより、直達光を採光することができる。また、透光部21、21、…に太陽電池素子列2b、2b、…が重なるため、屋外側から屋内を透視することを困難にする。

【0029】なお、回転軸5aを縦軸として揺動（開閉）可能に取り付けても良い。このとき、太陽電池素子列2a、2a、…及び太陽電池素子列2b、2b、…を縦列にしても良い。このような太陽電池モジュールを、例えば家屋の東側の窓材として用いた場合、太陽光線8の入射角度に合わせて容易に発電量及び採光量を調整することができる。また、太陽電池素子列2a、2a、…及び太陽電池素子列2b、2b、…は両面発電型であるため屋内側の光でも発電可能であるが、太陽電池素子列2b、2b、…は片面発電型でも良い。このとき、太陽電池素子列2b、2b、…は発電可能側を太陽電池素子列2a、2a、…側へ向けて配置する。

【0030】また、透光部21、21、…及び透光部22、22、…の縦方向の長さを、夫々太陽電池素子列2b、2b、…及び太陽電池素子列2a、2a、…の縦方向の長さより長くなるよう設けても良い。この場合、透光部21、21、…及び透光部22、22、…を透過する直達光の採光量が増加する。

【0031】実施の形態 2. 図3は、本発明の実施の形態2に係る太陽電池モジュールの構成を示す平面図、図4は、図3のIV-IV線の断面図である。

【0032】図中2は矩形の両面発電型の太陽電池素子（例えばHIT太陽電池素子）であり、数枚～数十枚の太陽電池素子2、2、…を接近して平面的に横方向に一系列配置して太陽電池素子列2a、2a、…とし、複数の太陽電池素子列2a、2a、…を、太陽光線8を透過す

る透光部 21, 21, …となる間隔を縦方向に隔てて平面的に並置し、全体として矩形の太陽電池素子群 20a にしてなる。該太陽電池素子群 20a は、矩形の透光板 1 と、該透光板 1 と同形状同面積の透光フィルム 4 との間に透光性の合成樹脂 3 を用いて積層してある。透光部 21, 21, …は、太陽電池素子列 2a と太陽電池素子列 2a との間に合成樹脂 3 によって形成されている。

【0033】同様に、前記太陽電池素子 2, 2, …を接近して平面的に横方向に一直列配置して太陽電池素子列 2b, 2b, …とし、複数の太陽電池素子列 2b, 2b, …を、透光部 22, 22, …となる間隔を縦方向に隔てて平面的に並置し、全体として矩形の太陽電池素子群 20b にして、透光板 1 と透光フィルム 4 との間に合成樹脂 3 を用いて積層してある。透光部 22, 22, …は、太陽電池素子列 2b と太陽電池素子列 2b との間に合成樹脂 3 によって形成されている。透光部 21, 21, …及び透光部 22, 22, …の縦方向の長さは、夫々太陽電池素子列 2b, 2b, …及び太陽電池素子列 2a, 2a, …の縦方向の長さより長くなるよう設けてある。

【0034】アルミニウムを用いた枠体 5 は、太陽電池素子群 20a 又は太陽電池素子群 20b の透光板 1 及び透光フィルム 4 の周縁部を、太陽電池素子群 20a と太陽電池素子群 20b との間に適宜な距離を置いて夫々嵌め込む部分を備える。太陽電池モジュールは、太陽電池素子群 20a, 20b を、該太陽電池素子群 20a, 20b の夫々の透光フィルム 4 を向かい合わせにして、太陽電池素子列 2a, 2a, …と透光部 22, 22, …とが重なり、太陽電池素子列 2b, 2b, …と透光部 21, 21, …とが重なるように枠体 5 に嵌め込まれてなる。このとき、太陽電池素子群 20a, 20b の夫々の透光フィルム 4 の間に空気が密閉されて断熱層 51 となる。

【0035】太陽電池素子列 2a, 2a, …及び太陽電池素子列 2b, 2b, …は、夫々配線 7 (例えば銅板に半田メッキした接続用銅板導線) を用いて直列又は並列に接続し、該配線 7 を介して太陽電池素子 2, 2, …が発生させた電力を取り出すための端子箱 9 に夫々接続されている。以上のような太陽電池モジュールを窓材として用いる場合、太陽電池素子群 20a 側を太陽光線 8 に向けて用いられる。このとき、前記太陽電池モジュールは実施の形態 1 と同様、発電効率を向上させ、採光機能を有効に利用できる。

【0036】また、透光部 21, 21, …と透光部 22, 22, …とは夫々太陽電池素子列 2b, 2b, …と太陽電池素子列 2a, 2a, …とに重ねられているが、透光部 21 及び透光部 22 は夫々太陽電池素子列 2b 及び太陽電池素子列 2a よりも縦方向に大きいため、透光部 21, 21, …と透光部 22, 22, …とが重なり、このため直達光の採光量が増し、また、屋内側から屋外を透視することができる。また、前記太陽電池モジュール

ルは断熱層 51 の断熱効果によって断熱性に優れており、また、遮音性にも優れる。

【0037】なお、太陽電池素子群 20a と太陽電池素子群 20b との間の距離を長くした場合、太陽電池モジュールは厚くなるが、透光部 21, 21, …を透過して透光部 22, 22, …を透過する太陽光線 8 の量が増加して直達光の採光量が増加し、太陽電池素子列 2b, 2b, …の表面で反射して太陽電池素子列 2a, 2a, …の裏面に入射する太陽光線 8 の量が増加して発電量が増加し、太陽電池素子列 2a, 2a, …の裏面で反射して透光部 22, 22, …を透過する太陽光線 8 の量が増加して間接光の採光量が増加する。更に、断熱層 51 に密閉される空気の量が増すため、断熱効果及び遮音効果も高まる。前記太陽電池モジュールは、嵌め殺しの窓として用いても良く、また、実施の形態 1 のように揺動による開閉が可能な窓として用いても良い。

【0038】実施の形態 3. 図 5 は、本発明の実施の形態 3 に係る窓構造の構成を示す平面図、図 6 は、図 5 の VI-VI 線の断面図、図 7 は、図 5 の VII-VII 線の断面図である。

【0039】前述した実施の形態 2 では、透光板 1 及び透光フィルム 4 に挟まれた太陽電池素子群 20a, 20b を枠体 5 に設置し固定的に一体化するが、実施の形態 3 の窓構造では、前記太陽電池素子群 20a 及び前記太陽電池素子群 20b を夫々枠体 50 に嵌め込んで、窓枠 6 に夫々引き戸状にして取り付け。各枠体 50 の縦方向の両端部には、レール部 6b, 6b 上の往復移動を補助する車輪部 5b, 5b, …が、前記太陽電池素子群 20a 又は太陽電池素子群 20b の重さ、摩擦等を考慮して、夫々複数取り付けられている。

【0040】窓枠 6 は、枠体 50 を移動可能に取り付けるためのレール部 6b, 6b を縦方向の両内面部に、奥行き方向に適宜な距離を置いて 2 組備える。レール部 6b, 6b, …は夫々窓枠 6 の横方向の内法と同じ長さに設けられている。

【0041】太陽電池モジュールは、太陽電池素子群 20a の透光フィルム 4 と太陽電池素子群 20b の透光板 1 とが向かい合わせになるように、レール部 6b, 6b, …に太陽電池素子群 20a の車輪部 5b, 5b, …及び太陽電池素子群 20b の車輪部 5b, 5b, …を乗せてなる。その他、実施の形態 2 と同一部分には同一符号を付してそれらの説明を省略する。

【0042】以上のような窓構造は、太陽電池素子群 20a の透光板 1 を太陽光線 8 に向けて、引き戸状の窓と同じように太陽電池素子群 20a 又は太陽電池素子群 20b を適宜移動して用いられる。

【0043】前記窓構造は引き戸状に開閉可能である。窓を開めた場合、太陽光線 8 は太陽電池素子列 2a, 2a, …及び太陽電池素子列 2b, 2b, …の表面に入射して発電に寄与する。このとき、太陽電池素子群 20a

と太陽電池素子群20bとが重ならないため、透光部21, 21, ...を透過した太陽光線8が太陽電池素子列2b, 2b, ...に遮蔽されることがなくなり、また、太陽電池素子列2a, 2a, ...が透光部22, 22, ...を遮蔽することがなくなるため、太陽光線8を透過させて直達光の採光量を増加させることができる。また、窓を開けた場合、太陽電池素子群20aと太陽電池素子群20bとが重なることとなるが、太陽電池素子列2aは透光部22と重なり、太陽電池素子列2bは透光部21と重なるので、実施の形態2同様、前記太陽電池モジュールは発電効率を向上させ、採光機能を備えることができる。

【0044】

【発明の効果】本発明の太陽電池モジュールによれば、両面発電型の太陽電池素子を用い、太陽光線を透過する透光部を隔てて複数枚の前記太陽電池素子を平面的に配置してなる第1太陽電池素子群と、少なくとも一面が発電に寄与する複数枚の太陽電池素子を透光部を隔てて平面的に配置してなる第2太陽電池素子群との間に、発電可能側を向かい合わせにして適宜の間隔を隔て、第1太陽電池素子群の太陽電池素子と第2太陽電池素子群の太陽電池素子とを交互に配置することにより、第1太陽電池素子群側を太陽光線に向けたとき、入射した太陽光線の一部が第1太陽電池素子群の太陽電池素子の表面に入射して発電に寄与し、前記太陽光線の残部が第1太陽電池素子群の透光部を透過して第2太陽電池素子群の太陽電池素子の表面に入射して発電に寄与して、第2太陽電池素子群の太陽電池素子の表面で反射した太陽光線の一部が第1太陽電池素子群の太陽電池素子の裏面に入射して発電に寄与し、第1太陽電池素子群の太陽電池素子の裏面で反射した太陽光線の一部が第2太陽電池素子群の透光部を透過して間接光の採光に寄与し、また、第1太陽電池素子群の透光部を透過した太陽光線の一部が第2太陽電池素子群の透光部を透過して直達光の採光に寄与して、発電効率を向上させて採光機能を備えることができる。

【0045】また、第2太陽電池素子群にも両面発電型の太陽電池素子を用いて窓材として用いる場合、屋内側からの光が第2太陽電池素子群の裏面に入射して発電に寄与し、発電効率を向上させることができる。また、第1太陽電池素子群の透光部の面積を第2太陽電池素子群の太陽電池素子の面積より大きく、第2太陽電池素子群の透光部の面積を第1太陽電池素子群の太陽電池素子の

面積より大きく設けることにより、第1太陽電池素子群の透光部と第2太陽電池素子群の透光部とが重なるため、直達光の採光量が增大する。また、第1太陽電池素子群と第2太陽電池素子群との間に透光性の断熱層を備えることにより、断熱性に優れた窓材として用いることができる。

【0046】また、本発明の窓構造によれば、太陽電池モジュールを揺動可能に設置することにより、揺動することによって開閉可能となる窓として用いることができ、第1太陽電池素子群及び第2太陽電池素子群と太陽光線との角度関係を調節して、発電効率を向上させ、採光量を調節することができる。更に、本発明の窓構造によれば、2群の太陽電池素子群を引き戸状に設置することにより、相対移動することによって開閉可能な窓として用いることができ、太陽電池素子と透光部との位置関係が調整可能となって採光量が調整できる等、本発明は優れた効果を奏する。

【図面の簡単な説明】

【図1】本発明の実施の形態1に係る太陽電池モジュールの構成を示す平面図である。

【図2】図1のII-II線の断面図である。

【図3】本発明の実施の形態2に係る太陽電池モジュールの構成を示す平面図である。

【図4】図3のIV-IV線の断面図である。

【図5】本発明の実施の形態3に係る窓構造の構成を示す平面図である。

【図6】図5のVI-VI線の断面図である。

【図7】図5のVII-VII線の断面図である。

【図8】採光機能を備える従来の太陽電池モジュールの構成を示す縦断面図である。

【符号の説明】

2 太陽電池素子

2a 太陽電池素子列

21 透光部

2b 太陽電池素子列

22 透光部

20a 太陽電池素子群

20b 太陽電池素子群

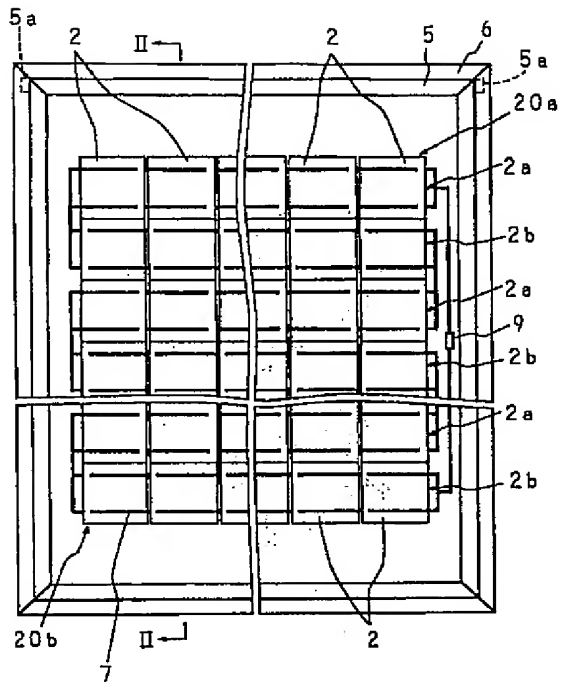
5a 回転軸

5b 車輪部

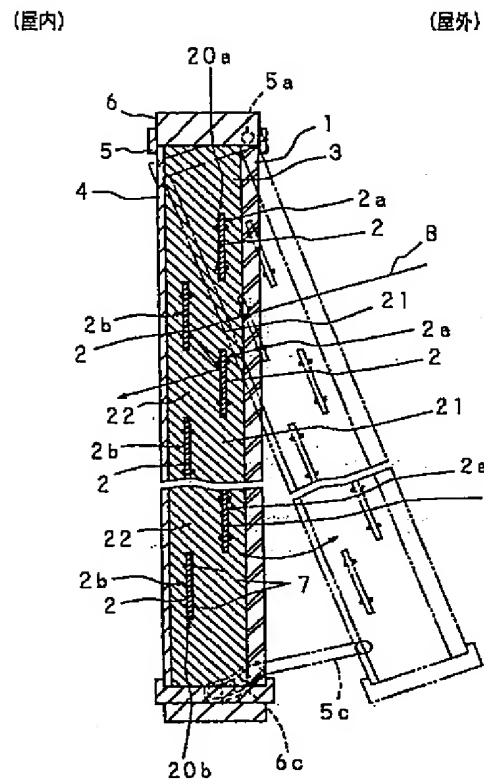
51 断熱層

6b レール部

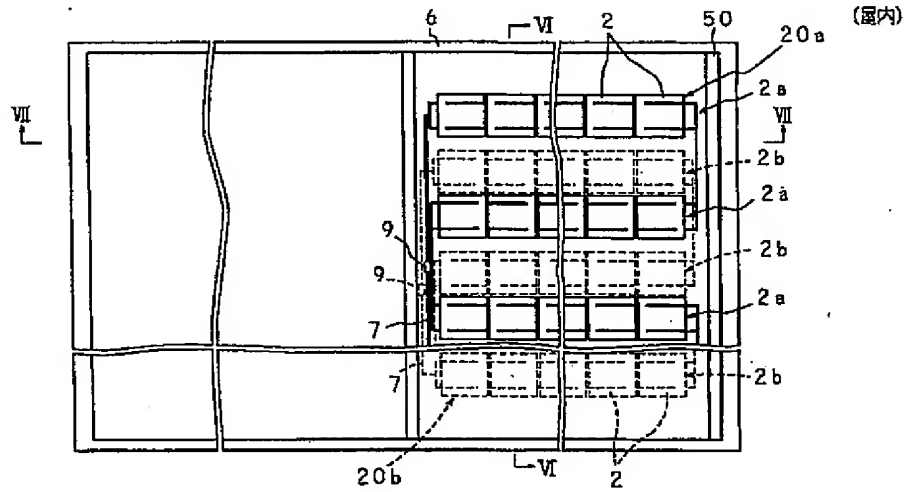
【図1】



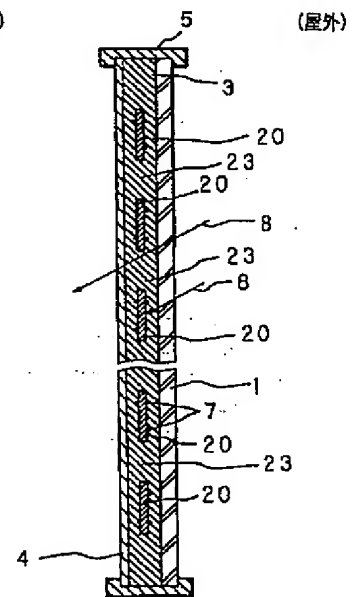
【図2】



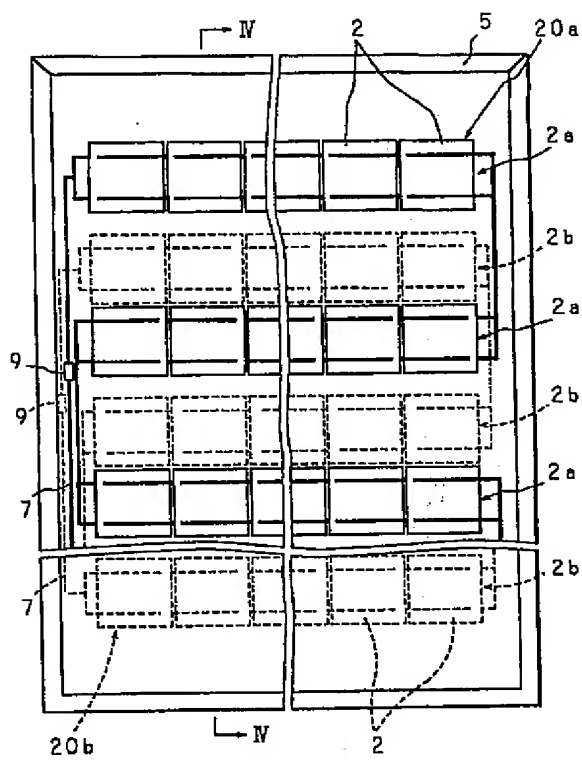
【図5】



【図8】



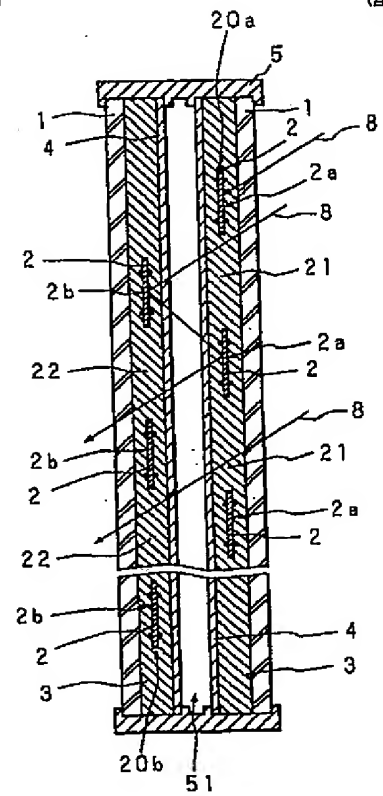
【図3】



【図4】

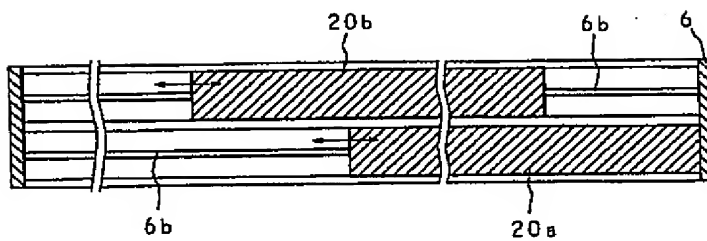
(屋内)

(屋外)



【図7】

(屋内)



(屋外)

【図6】

(屋内)

(屋外)

